Supreme Court, U. S.
FILED
MAR 3 1978
MICHAEL RODAK, JR., CLERK

APPENDIX

In the Supreme Court of the United States

OCTOBER TERM, 1977

No. 77-642

LUTRELLE F. PARKER, ACTING COMMISSIONER OF PATENTS AND TRADEMARKS, PETITIONER

v.

DALE R. FLOOK

ON WRIT OF CERTIORARI TO THE UNITED STATES COURT OF CUSTOMS AND PATENT APPEALS

PETITION FOR A WRIT OF CERTIORARI FILED NOVEMBER 2, 1977
CERTIORARI GRANTED JANUARY 16, 1978

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U.S. GOVERNMENT PRINTING OFFICE: 1978

IN THE MATTER OF THE APPLICATION OF DALE R. FLOOK

Term and Docket No. 77–512

Board of Appeals; Serial No. 194,032

[Filing Date October 29, 1976]

For: Method for Updating Alarm Limits

Counsel for appellant: Frank J. Uxa, Commissioner of Patents and Trademarks

Date	Proceedings and Orders
1977	
Jan. 24	Printed Transcript of Record, filed.
Mar. 21	Brief for Appellant, filed.
May 2	Brief for Commissioner of Patents & Trademarks, filed.
June 3	Argued
Aug. 4	Reversed, Baldwin, Judge.
Aug. 26	Final Mandate issued this date to the Commissioner of Patents and Trademarks
Nov. 2	Petition for Writ of Certiorari filed in the Supreme Court of
1978	the U.S. No. 77–642.
Jan. 16	Petition for Writ of Certiorari granted.

256-017—78——1

In the Supreme Court of the United States

OCTOBER TERM, 1977

No. 72-642

LUTRELLE F. PARKER, ACTING COMMISSIONER OF PATENTS AND TRADEMARKS, PETITIONER

v.

DALE R. FLOOK

ON WRIT OF CERTIORARI TO THE UNITED STATES COURT OF CUSTOMS AND PATENT APPEALS

Patent Appeal No. 77-512

Transmittal Letter, October 29, 1971

The COMMISSIONER OF PATENTS,
Washington, D.C. 20231

SIR: Transmitted herewith for filing is the patent application of

Inventor: DALE R. FLOOK
For: METHOD
Enclosed are:
[ ] ——— sheets of drawing.
[ ] An assignment of the invention to ———

[ ] A certified copy of ———————— application.

[ ] Associate power of attorney.

CLAIMS AS FILED					
	(1) FOR	(2) NUMBER FILED	(3) NUMBER EXTRA	(4) RATE	(5) BASIC FEE $65.00
	TOTAL CLAIMS	10 -10=	0	x $2.00	0.00
	INDEPENDENT CLAIMS	1 -1=	0	x $10.00	0.00
			TOTAL FILING FEE →		$ 65.00

[ ] Please charge my Deposit Account No. ———— in the amount of $ ————. A duplicate copy of this sheet is enclosed.

[ ] The Commissioner is hereby authorized to charge any additional fees which may be required, or credit any overpayment to Account No. ————. A duplicate copy of this sheet is enclosed.

[X] A check in the amount of $65.00 to cover the filing fee is enclosed.

Applied

FRANK J. UXA,
Attorney of Record.

October 27, 1971.

APPLICATION OF DALE R. FLOOK

[Filed October 29, 1971] Serial No. 194,032

FOR METHOD FOR UPDATING ALARM LIMITS

ABSTRACT OF THE DISCLOSURE

A method for updating the values of alarm limits on process variables involved in a process comprising catalytic chemical conversion of hydrocarbons is disclosed. The method utilizes the present value of the process variable in question, the current value of the alarm limit, an alarm offset K and a number F to provide an updated value for the alarm limit.

This invention relates to improved process monitoring systems. More particularly, the invention relates to process alarm systems which facilitate increased safety and efficiency in process operation.

Throughout the hydrocarbon processing industries, e.g., petroleum refining, petrochemical industry and the like, numerous catalytic conversion processes, e.g., naphtha reforming, gas oil hydrocracking and desulfurization, aromatic and paraffin isomerization and disproportionation, paraffin-olefin alkylation and the like, involve process variables, e.g., temperature, pressure, heat input, flow rates and the like, which are monitored to insure safe and efficient process operation. The variables monitored include those not directly associated in the catalytic conversion of hydrocarbons, e.g., heat input (measured by temperature increase) to a bed of catalyst prior to the introduction of hydrocarbon and the like, as well as variables directly associated with hydrocarbon conversion, e.g., reaction temperature, pressure and the like. Because of the large number of variables which may require monitoring, a practice has arisen whereby a fixed alarm limit (or limits) is set for each individual process variable. In this situation, the value of the process variable may vary within the fixed alarm limit.

However, if the variable value moves outside this fixed alarm limit, the operating personnel may be automatically notified, usually by an alarm sounding, of this circumstance which can then be corrected to insure the safety and efficiency of the process. Therefore, these fixed alarm limits simplify the task of monitoring a set of process variables.

However, these fixed alarm limits do have serious disadvantages which reduce their effectiveness. First, the values of these fixed alarm limits are set for one specific operating situation, for example, a steady state flow rate of 5 gal./min. with fixed alarm limits at 4 gal./min. and 6 gal./min. If, for any reason, the steady state operation is altered, for example, to a flow rate of 6.5 gal./min., the fixed alarm limits may have to be manually updated to reflect this change. If a large number of process variables are changed, the manual updating of the fixed alarm limits becomes a tedious and time-consuming job for the operating personnel. Also, manual changing of the fixed alarm limits may increase the possibility of human error since the new fixed alarm limits may not be set properly.

Another disadvantage of the fixed alarm limit concept of process monitoring is seen when the processing operation is in a transient, rather than a steady state, operating situation, e.g., process start-up, recovery from a process upset, batch-type or other processes in which the values of one or more process variables are expected to change with time and the like. In these "normal" transient situations, violations of the fixed alarm limits may often be signalled without any abnormal process condition occurring. These "false alarms" tend to reduce the reliability of the monitoring-alarm system and may cause the operating personnel to disregard all alarm warnings, including those signalling true abnormal conditions. In general, since the fixed alarm limits may be ineffective during process transcience, process monitoring may be more difficult, and process safety and efficiency may be decreased during transient operation.

Therefore, one of the objects of the present invention is to provide a method for determining updated alarm limits for process variables the values of which may vary to accommodate different process operations.

An additional object of the present invention is to provide a method whereby the reliability of process alarm signals as indications of process conditions requiring attention is improved.

A further object of the present invention is to provide an improved method for updating alarm limits for process variables the values of which normally change with time. Other objects and advantages of the present invention will become apparent hereinafter.

It has now been found that the value of at least one alarm limit on at least one process variable involved in a process comprising the catalytic chemical conversion of hydrocarbons can be advantageously updated by the following method. The current value of the alarm limit (CAV) may be used to define the current alarm base, denoted as Bo, as follows:

$$CAV=Bo+K$$

wherein K is a predetermined alarm offset. At a steady state process operation in which the process variable in question has a constant value, K represents the difference between the constant value of the alarm limit and the constant value of the process variable in question.

The present method comprises:

(1) determining the present value, denoted as PVL, of the process variable in question,

(2) determining a new alarm base, denoted as B_1, using the following equation:

$$B_1=Bo\ (1.0-F3+(PVL)\ F$$

where F is a predetermined number greater than zero and less than 1.0; and

(3) adjusting said alarm limit to an updated value, UAV, which is defined as

$$UAV=B_1+K$$

The alarm offset K may be of any predetermined value. Typically, the alarm offset K may be within the range from about 0.1% to about 50% or more, preferably from about 0.1% to about 25%, of the normal present value of the process variable whose alarm limit is being updated. For example, if the normal present value of the reaction or reactor (e.g., catalyst bed) temperature is 600° F., the alarm offset K can be within the range from about 0.6° F. to about 300° F., preferably within

the range from about 0.6° F. to about 150° F. Similarly, if the reaction or reactor pressure has a normal present value of 1700 psi., the alarm offset K may be within the range from about 1.7 psi., to about 800 psi., preferably within the range from about 1.7 psi. to about 425 psi. Typical ranges for alarm offsets for other process variables can be determined in an analogous manner.

The alarm offset K and number F used in the method of the present invention are predetermined based upon experience with the normal behavior with time of the individual process variable in question. For example, if a given process variable is to be maintained within a relatively narrow range, the values for K and/or F may be relatively small. On the other hand, if the process variable may vary over a wide range without indicating or giving rise to a process upset, the values for K and/or F may be relatively large. Also, the value of F will vary depending on the frequency with which the value of the alarm limit is updated according to the present invention. For example, the value of F may increase as the time between the updates is increased. In short, the values assigned to K and F may be determined through routine experimentation, taking into account the normal behavior and criticality of the process variable in question, as well as frequency of alarm limit updating and the like considerations.

In many instances, the method of the present invention may be used to determine two updated alarm limits, i.e., an upper alarm limit and a lower alarm limit, for a single process variable. For example, reactor or reaction temperature may have an upper alarm limit and a lower alarm limit. When the method of the present invention is used to update both upper and lower alarm limits on a process variable, the alarm offset and number F may be the same (provided that the sign on K is inverted) or different for each updated alarm limit determined. When upper and lower updated alarm limits on a single process variable are to be determined, it is preferred that the same number F and absolute value of alarm offset K be used in determining each updated alarm limit. In this circumstance, if the updated upper alarm limit is determined using K, the updated lower alarm limit is determined using –K (i.e., minus K) in place of K in the present method. Of course, the method of the present invention may

be used to determine two or more updated alarm limits for a single process variable using different values for K and/or F.

The method of the present invention may be used to update the alarm limits on process variables the values of which either normally remain constant, for example, in steady state operation, or exhibit transcient behavior, i.e., are expected to change with time for at least a portion of the processing interval or cycle. However, it is preferred to use the present method to update alarm limits on process variables which exhibit transcient behavior, i.e., transcient variables. Among the reasons for this preference is the fact that the present invention provides for determination of updated alarm limits by taking into account the present or current value of the variable. Thus, the value of the transcient variable may exhibit its normal transcient behavior without violating any alarm limits. However, abnormal transcient behavior does violate the updated alarm limit or limits. Thus, the present invention substantially reduces false alarm limit violations for transcient variables and, therefore, provides a more reliable process alarm system.

Although the method of the present invention may be used to manually update alarm limits, it is preferred that the present method be used so that alarm limits may be adjusted to updated values automatically, i.e., without human manipulation of the alarm limits, e.g., by electronic means. This preferred embodiment provides for quick efficient updating of alarm limits with a minimum chance for human error as well as being particularly useful, e.g., labor-saving, when a large number, e.g., more than about 10, updated alarm limits are to be determined and/or the transcient nature of a process variable(s) requires frequent monitoring or alarm limit updating. This preferred embodiment of the present invention may be achieved by practicing the method of the present invention in conjunction with conventional automatic, e.g., electronic, monitoring-alarming equipment. Thus, automatic monitoring-alarming equipment may be supplied with the relevant alarm offset K and number F as well as the mathematical relationships needed to make certain determinations involved in the present method. The monitoring-alarming equipment periodically scans the PVL and determines the updated alarm limit(s) using the method of the present invention. The alarm limit(s) of the monitoring-alarming equipment are automatically ad-

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justed, if necessary, to the UAV determined by the method of the present invention. The automatic equipment which may be used in this embodiment of the present invention is conventional and well-known in the art.

The present invention may be used to update the value of alarm limits on process variables involved in processes comprising the catalytic chemical conversion of hydrocarbons, such as that involved in petroleum refining and petrochemical processing and the like. Included among these conventional and well known hydrocarbons conversion processes in which the present method is applicable are the following: naphtha reforming and desulfurization; petroleum distillate and petroleum residuum cracking, hydrocracking and desulfurization; aromatic hydrocarbon and paraffin isomerization and disproportionation; olefin di- and tri-merization; paraffin-olefin alkylation and the like processes. As noted previously, the alarm limits which may be updated according to the present invention include not only those directly used to control the hydrocarbon chemical conversion, e.g., reaction temperature, reaction pressure, reactant and poduct flow rates, and the like; but also those variables which indirectly affect the efficiency of the chemical conversion. Examples of this latter type of variable include: reaction zone temperature and/or pressure when hydrocarbon is not being processed, for instance, when the catalyst is being treated to improve its activity or to otherwise prepare it for the introduction of hydrocarbon; and the like variables.

Typical operating conditions and catalyst compositions employed in these conventional processes comprising catalytic chemical conversion of hydrocarbons are well known to those skilled in the art and may be varied to meet the requirements of the individual hydrocarbon processes. For this reason, individual process conditions and catalyst compositions are not enumerated herein. The values of K and F used in the method of the present invention can also be set depending on the hydrocarbon conversion process involved, the nature of the process variable being monitored, as well as the requirements and capabilities of the individual hydrocarbon processor.

The present method has further particular applicability in updating the value of alarm limits on process variables involved in processes comprising petroleum distillate hydrocracking.

Hydrocracking is a general term applied to refining processes wherein hydrocarbon feedstocks of relatively high molecular weight are chemically converted to mixtures of hydrocarbons of lower molecular weights and wherein the conversion is carried out at elevated temperature and pressure in the presence of a hydrogen-containing gas. In hydrocracking, typically, hydrocarbon feeds such as catalytic cycle oils and gas oils boiling in the range of about 350° F. to 1,000° F., are catalytically hydrocracked in the presence of hydrogen-containing gas to obtain gasoline boiling range products and light distillates. The process conditions which are employed in the hydrocracking process can be selected over a relatively wide range and are correlated, according to the nature of the hydrocarbon feed and of the particular catalyst employed, so as to produce either a desired conversion; i.e., as the percentage of feed converted to product, or a product of a desired octane number. Satisfactory conversions are obtained with the above described feedstocks at pressures in the range from about 200 psig. to about 2,000 psig. and temperatures in the range from about 400° F. to about 1,000° F. Advantageously, pressures in the range from about 750 psig. to about 1,800 psig. and temperatures in the range from about 500° F. to about 850° F. are employed.

Typical space velocities used in the hydrocracking reaction zone, expressed herein as liquid hourly space velocity (LHSV) in terms of volume of oil charged to the reaction zone per hour per volume of catalyst, may range from about 0.1 LHSV to about 10 LHSV, normally from about 0.2 LHSV to about 5 LHSV and preferably from about 0.25 LHSV to about 2 LHSV.

Hydrogen is consumed in the hydrocracking process and it is necessary to maintain an excess of hydrogen in the reaction zone. The hydrogen to hydrocarbon feed ratio is normally in the range from about 1,000 to about 20,000 standard cubic feet of hydrocarbon gas per barrel of feed (scfb), preferably in the range from about 5,000 scfb to about 15,000 scfb.

The catalyst employed in the hydrocracking process may be selected from the various well known hydrocracking catalysts which typically comprise a hydrogenation component and a solid acidic cracking component. The acidic cracking component

of the catalyst may comprise one or more solid acidic components such as silica-alumina (naturally occurring and/or synthetic) silica-magnesia, silica-alumina-zirconia, and the like. Also, acid-treated-aluminas, with or without halogen, polyacid-treated-aluminas, i.e., treated with phosphotungstic acid, phosphovanadic acid, silicotungstic acid, silicomolybdovanadic acid and the like, may be employed. A preferred acidic component of the catalyst composition is one of the commercially available synthetic silica-alumina cracking catalysts which may contain about 5% to about 40% by weight, of alumina. Preferably, the acidic component of the catalyst is employed as a support and it is highly porous, having a surface area in the range from about 100 $m^2/gm.$ to about 500 $m^2/gm.$ The preparation and properties of the acidic cracking components are well known in the art and, therefore, need not be described further herein for the purpose of the present invention.

Many of the well-known metallic hydrogenation catalysts may be incorporated in the hydrocracking catalyst, but preferably, the metallic constituent of this catalyst is selected from the metals of Group VIII of the Periodic Table which possess satisfactory hydrogenation activities, especially nickel, platinum, cobalt, palladium, rhodium and ruthenium. The hydrogenation component of the catalyst advantageously can be incorporated into the catalyst by impregnating a porous acidic cracking component with a heat-decomposable compound of the hydrogenation metal, followed by calcining to provide a composite. Typically, a silica-alumina cracking catalyst or an acid-treated alumina base is impregnated with a solution of nickel acetate, chloroplatinic acid or the like, and then dried followed by pelleting and calcining at an elevated temperature, e.g., about 1,000° F.

The following examples illustrate the method of the present invention.

Example I

Startup procedure for a distillate hydrocracking process employing a reactor bed of solid catalyst calls for a controlled temperature increase with the time in the reactor bed prior to introduction of the hydrocarbon feedstock. The reactor bed temperature is increased by circulating hydrogen through a fired heater and then to the reactor bed. The process variable, i.e.,

reactor bed temperature, has an upper alarm limit. This alarm limit is updated using the method of the present invention. From experience, it was determined that if the reactor bed temperature is to be monitored every 10 minutes, an alarm offset K of +9° F. and a number F of 0.60 provide satisfactory control.

With the reactor bed temperature at 432° F., the alarm limit is set at 441° F. Therefore, Bo=CAV—K or 441° F.—9° F. which is 432° F. The reactor bed temperature is monitored every ten minutes and an updated alarm limit is to be determined each time the variable is monitored. After 10 minutes, the reactor bed temperature has risen to 436° F. The value of B_1 is determined as follows:

$$B_1 = Bo\ (1—F) + PVL(F)$$

$$B_1 = 432\ (0.4) + 436\ (0.6) = 434.4°\ F.$$

The updated alarm limit is determined as follows:

$$UAV = B_1 + K = 434.4°\ F. + 9°\ F. = 443.4°\ F.$$

After 20 minutes, the reactor bed temperature has risen to 440.5° F. The current alarm base value, Bo, is

$$CAV - K = 443.4°\ F. - 9°\ F. = 434.4°\ F.*$$

The new alarm base value, B_1, is as follows:

$$B_1 = 434.4°\ F.\ (1.0—0.6) + 440.5\ (0.6)$$

$$B_1 = 438.1°\ F.$$

Therefore, the updated alarm limit is:

$$UAV = B_1 + K = 438.1°\ F. + 9°\ F. = 447.1°\ F.$$

Using the method of the present invention illustrated by the above procedure at 10 minute intervals, the following results were obtained:

*Note that the value of Bo is the same as the last previously determined value of B_1

Time, min.	Reactor bed temp. °F.	Current alarm limit, °F.	Updated alarm limit, °F.
0	432	441	----------
10	436	441	443. 4
20	440. 5	443. 4	447. 1
30	444. 5	447. 1	450. 9
40	448	450. 9	454. 6
50	453. 5	454. 6	456. 3
60	457	456. 3	463. 3
70	461. 5	463. 3	467. 6
80	465. 5	467. 6	471. 7
90	473	471. 7	477. 9
100	490	477. 9	490. 6
110	515	490. 6	510. 6

An alarm was signaled indicating an excessive temperature increase at some point between 100 and 110 minutes. Corrective action may be taken to remedy this situation.

Example II

This example illustrates the use of electronic monitoring-alarming equipment in conjunction with the method of the present invention.

The processing system used in this example is similar to that employed in Example I. The electronic monitoring-alarm equipment was the same as that conventionally employed in the dydrocarbon processing industries. The value of the process variable in question, i.e., reactor bed temperature, was inputed to this automatic equipment which scanned this value once every minute. The various relationships needed to practice the method of the present invention were also inputed to this equipment. The alarm offset K was set at 9° F. and F was given a value of 0.025. Initially, the alarm limit was manually set. Each time the reactor bed temperature was scanned, this alarm limit was automatically updated according to the method of the present invention. The new, i.e., updated, alarm limit was set by the automatic equipment without human interference and without the possibility of human error.

Below is a tabulation, at 10 minute intervals, of the reactor bed temperatures scanned and alarm limits determined according to the present invention using the electronic equipment as described above.

Time, min.	Reactor bed temp. °F.	Current alarm limit, °F.	Updated alarm limit, °F.
0	432	441	----------
10	436. 6	441	445. 3
20	440. 8	445. 3	449. 5
30	444. 9	449. 5	453. 6
40	449. 1	453. 6	457. 7
50	453. 2	457. 7	461. 9
60	457. 3	461. 9	466. 0
70	461. 5	466. 0	470. 2
80	465. 6	470. 2	474. 3
90	472. 7	474. 3	478. 7
100	482. 7	478. 7	484. 1
110	492. 7	484. 1	490. 7

An alarm was indicated between 100 and 110 minutes (actually after the 104th minute) indicating an excessive rise in the reactor bed temperature.

The preceding examples illustrate many of the advantages of the present invention. If a fixed alarm limit had been set on the reactor bed temperature in the above illustrations, repeated false alarms would have been signaled, or the fixed limit set so high as to be ineffective in calling attention to an abnormal condition. Thus, these illustrations show that fixed alarm limits are of marginal usefulness during transcient process operation. On the other hand, alarm limits updated by the method of the present invention allow normal transcience of the variable value while still calling attention to truly abnormal conditions. Using the method of the present invention in conjunction with automatic monitoring-alarming equipment has added advantages including reducing tedious labor as well as the risk of human error, and allowing more variables to be controlled.

While this invention has been described with respect to various specific examples and embodiments, it is to be understood that the invention is not limited thereto and that it can be variously practiced within the scope of the following claims.

The embodiments of the invention in which an exclusive property of privilege is claimed are defined as follows:

1. A method for updating the value of at least one alarm limit on at least one process variable involved in a process comprising the catalytic chemical conversion of hydrocarbons wherein said alarm limit has a current value of

$$Bo+K$$

where Bo is the current alarm base and K is a predetermined alarm offset which comprises:

(1) determining the present value of said process variable, said present value being defined as PVL;

(2) determining a new alarm base, B_1, using the following equation:

$$B_1=Bo(1.0-F)+PVL\ (F)$$

where F is a predetermined number greater than zero and less than 1.0;

(3) adjusting said alarm limit to an updated value which is defined as

$$B_1+K$$

* * * * *

For Claim 2, see Rejected Claim 2.

3. The method of claim 1 wherein step (3) comprises automatically adjusting said alarm limit to an updated value which is defined as B_1+K.

* * * * *

For Claims 4 to 10 inclusive, see Rejected Claims 4 to 10 inclusive.

Declaration, Power of Attorney, and Petition

Sole Original (SEAL)

Case No. 13-0039

I, Dale R. Flook, declare that I am a citizen of the United States of America residing at P.O. Box 787, Wilmington, California 90744 that I have read the foregoing specification and claims and I verily believe I am the original, first, and sole inventor of the invention in

METHOD

described and claimed therein; that I do not know and do not believe that this invention was ever known or used before my invention thereof, or patented or described in any printed publication in any country before my invention thereof, or more than one year prior to this application; or in public use or on sale in the United States more than one year prior to this application; that this invention has not been patented in any country foreign to the United States on an application filed by me or my legal representatives or assigns more than twelve months before this application; and that no application for patent on this invention has been filed by me or my representatives or assigns in any country foreign to the United States, except as follows:

I hereby appoint Thomas J. Clough, Frank J. Uxa and Blucher S. Tharp having Registration Numbers 22337, 25612 and 19502, respectively, my attorneys with full power of substitution and revocation, to prosecute this application and to transact all business in the Patent Office connected therewith.

The Patent Office is requested to direct all mail to said Thomas J. Clough at the following address:

ATLANTIC RICHFIELD COMPANY
400 East Sibley Boulevard
Harvey, Illinois 60426

256-017—78——3

I declare further that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements are made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of this application or any patent issuing thereon.

Wherefore I pray that Letters Patent be granted to me for the invention described and claimed in the foregoing specification and claims, and I hereby subscribe my name to the foregoing specification and claims, declaration, power of attorney, and this petition, this 22 day of October, 1971.

Inventor:	Dale	Rowen	Flook
	(First Name)	(Middle Initial)	(Last Name)

400 East Sibley Boulevard, Harvey, Illinois 60426
(P.O. Address)

This form may be executed only when attached to a complete application as the last page thereof.

Letter of Examiner, September 24, 1973

Paper No. 7

[ ] This application has been examined.
[X] Responsive to communication filed 7–9–1973 & 9–4–1973
[ ] This action *is made final.*

A SHORTENED STATUTORY PERIOD FOR RESPONSE TO THIS ACTION IS SET TO EXPIRE 3 MONTH(S) ~~DAYS~~ FROM THE DATE OF THIS LETTER.

PART I

THE FOLLOWING ATTACHMENT(S) ARE PART OF THIS ACTION

a. [ ] Notice of References Cited, Form PO–892.
b. [ ] Notice of Informal Patent Drawing, PO–948.
c. [ ] Notice of Informal Patent Application, Form PO–152.
d. [ ]

PART II

SUMMARY OF ACTION

1. [X] Claims 1–10 are presented for examination.
2. [ ] Claims ———— are allowed.
3. [ ] Claims ———— would be allowable if amended as indicated.
4. [X] Claims 1–10 are rejected.
5. [ ] Claims ———— are objected to.
6. [ ] Claims ———— are subject to restriction or election requirement.
7. [ ] Claims ———— are withdrawn from consideration.
8. [ ] Since this application appears to be in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under Ex parte Quayle, 1935 C.D. 11; 453 OG. 213.
9. [ ] Since it appears that a discussion with applicant's representative may result in agreements whereby the

application may be placed in condition for allowance, the examiner will telephone the representative within about 2 weeks from the date of this letter.

10. [ ] Receipt is acknowledged of papers under 35 USC 119, which papers have been placed of record in the file.
11. [ ] Applicant's claim for priority based on an application filed in _____ on _____ is acknowledged. It is noted, however, that a certified copy as required by 35 USC 119 has not been received.
12. [ ] Other.

The final rejection is withdrawn in order to add a new rejection of all claims under 35 USC 101. This rejection is being made in accordance with the recent court decision in In re Christensen 178 USPQ 35.

Claims 1–10 are rejected under 35 USC 101 as being drawn to an invention which is not one of the types of inventions set forth in 35 USC 101 as patentable under the Statutes. It appears that the only difference between these claims and the prior art is in the mathematical formula involved in updating the value of an alarm limit.

It is the Examiner's opinion that the claims are in fact drawn to an algorithm or a patent containing these claims would in practical effect be a patent on the algorithm itself.

Except for the term "automatically" in claim 3 which term is unsupported by structure or method steps, the claims clearly read on an operator making "pencil and paper" calculations and adjusting the controls accordingly.

Claims 3, 6, 9 & 10 are rejected under 35 USC 112, 1st paragraph as being drawn to an invention insufficiently disclosed for reasons stated in the objection to the specification.

The specification is objected to under 35 USC 112, 1st paragraph in that it fails to disclose the invention claimed. There is insufficient disclosure of how the alarm limits are "automatically" adjusted and of the electronic means.

Applicant in his response of July 9, 1973, on page 3 thereof, states that the "Summary Manual is of particular importance in that it illustrates that adjustable alarm limits may be used with this conventional automatic equipment".

No where in the publications accompanying the amendemnt is there a showing that automatic-alarming equipment supplied with the relevant alarm offset K and number F as well as the mathematical relationships needed to make certain determinations involved, is conventional.

Eugene G. Botz,
EUGENE G. BOTZ,
Examiner,
Group Art Unit 236.

SEPTEMBER 21, 1973.

Letter to Office, December 19, 1973

Letter "B"

Hon. COMMISSIONER OF PATENTS,
Washington, D. C. 20231

SIR: The above-identified application has been carefully reviewed in light of the Examiner's Communication mailed September 24, 1973. Applicant acknowledges the Examiner's action in withdrawing the final rejection stated in the communication mailed May 7, 1973.

Claims 1 to 10 have been rejected under 35 U.S.C. 101 as being drawn to an invention which is not one of the types of inventions patentable under the Statutes. Applicant traverses this rejection.

The present invention comprises an improved method for updating at least one alarm limit value on at least one process variable involved in a catalytic conversion process. The method involves predetermining an alarm offset K, determining the present value of the process variable in question, determining a new alarm base B_1 according to a specified mathematical relationship, defining an updated alarm limit value as B_1+K, and adjusting the alarm limit to the updated value. This adjusting of the alarm limit, which is a positive step of the method recited in claims 1 to 10, may be done automatically, i.e., without human manipulation of the alarm limits, for example, by electronic means.

The Examiner states that the present claims clearly read on an operator making "pencil and paper" calculations and adjusting the controls accordingly. The Examiner's position is that the decision in In re Christensen, (CCPA), 178 U.S.P.Q. 35, holds that such claims are unpatentable.

In In re Christensen, patent protection was sought for a method of determining the porosity of subsurface formations. This method involved determining a series of factors and finally determining the porosity by solving a mathematical relation-

ship involving such factors. In deciding this case, the Court of Customs and Patent Appeals stated, in pertinent part, as follows:

> The issue before us in the instant case is also a narrow one, namely, is a method claim in which the point of novelty is a mathematical equation to be solved as the *final step* of the method, a statutory method? We follow the Supreme Court in concluding that the answer is in the negative. Given that the method of solving a mathematical equation may not be the subject of patent protection, it follows that the addition of the old and necessary antecedent steps of establishing values for the variables in the equation cannot convert the unpatentable method to patentable subject matter. [Emphasis added]

The above-identified application is clearly distinguished from the holding in In re Christensen. For example, solving a mathematical relationship is not the final step of applicant's method. Also, unlike In re Christensen, applicant's method does not involve solving a methematical relationship simply to determine a value. Applicant does not seek to patent a mathematical relationship or algorithm. The present claims positively recite that the updated alarm limit value as determined is used in adjusting at least one alarm limit on at least one process variable involved in a catalytic conversion process. Thus, applicant has clearly invented a method useful within the technological arts as required by 35 U.S.C. 101. In re Waldbaum (CCPA), 173 U.S.P.Q. 430. This is contrary to In re Christensen wherein the claims involved conventional antecedent steps necessary to the final step of solving a mathematical relationship simply to determine a value. Since the above-identified application is clearly distinguished from In re Christensen and since the statute has clearly been complied with, applicant submits that claims 1 to 10 are drawn to patentable subject matter under 35 U.S.C. 101.

Claims 3 to 6, 9 and 10 are rejected under 35 U.S.C. 112, first paragraph, as being drawn to an invention insufficiently disclosed. Applicant traverses this rejection.

Applicant has discovered an improved method for automatically updating and adjusting at least one alarm limit on at least one process variable using, for example, electronic means.

The method involves predetermining a number F between zero and 1.0 and an alarm offset K. On pages 6 and 7 of the specification, applicant has disclosed that automatic monitoring-alarming equipment is supplied with K, F and certain mathematical relationships needed to determine the updated alarm limit. The equipment scans and determines the present value of the process variable in question. Using this value and the other inputs noted above, the equipment determines at least one updated alarm limit and adjusts the alarm limit according to the present method. This embodiment is also illustrated in Example II of the above-identified application. In each instance, the equipment, e.g., electronic means, which may be used to automatically adjust alarm limits according to the present invention is conventional and well known in the art.

In order to demonstrate that such equipment is conventional and well known in the art, applicant has previously submitted the following publications:

> Wherry, T.C. et al, *Direct Digital Control*, Chemical Engineering Progress, Vol. 64, No. 4, pp. 33–38 (April 1968).
>
> *Summary Manual/BE–DDC Direct Digital Control*, pp. 4 and 5 Copyright 1969 by General Electric.
>
> *GE/PAC 4020, System Summary Manual*, p. 2–2 Copyright 1970 by General Electric Co.

The Examiner contends there is insufficient disclosure of how the alarm limits are automatically adjusted and of the electronic means. Specifically, the Examiner states that nowhere in the previouslv submitted publications is there a showing that automatic-alarming equipment supplied with the relevant alarm offset K and number F as well as the mathematical relationships needed to make certain determination involved, is conventional.

However, the *Summary Manual/GE–DDC Direct Digital Control* clearly refers to electronic equipment, e.g., computers, and soft wear packages which can be used to automatically adjust alarm limits in a manner defined by the user. For example, this reference at the bottom of the first column of page 5 states:

> Limit Check
>
> After filtering, inputs are compared to *adjustable* high and low limits which are *defined by user*. * * * [Emphasis added]

This reference does not teach, or even suggest, applicant's method of adjusting alarm limits, but it does clearly show that automatic equipment capable of adjusting alarm limits according to user definition is conventional. Further, *GE/PAC 4020, System Summary Manual* shows clearly that it is conventional to introduce mathematical relationships needed to adjust alarm limits into such automatic equipment. This latter reference describes one such conventional system as follows:

> BICEPS scans the process sensors, filters the measurements signals, performs limit checks, and computes set points. The process loops are defined by filling out special forms, from which punched cards are prepared for reading into the computer's memory. Individual loop control calculations may be specified through a special, but simple, BICEPS Programming Language (BPL). The language is similar to FORTRAN, and allows process engineers with little or no programming experience to define the specific calculations needed for each loop.

Again, this reference does not teach, or even suggest, the present invention, but does indicate that, given the present specification, it is well within the ordinary skill of the art to automatically adjust at least one alarm limit according to the present invention.

In view of the conventional nature of the automatic equipment, e.g., computers, and means, e.g., computer programs, for introducing mathematical relationships into such equipment, applicant submits that it is not necessary to detail such equipment and such means in order to enable one of ordinary skill in the art to practice the present invention. Since one of ordinary skill in the art, given the disclosure of the present specification, would be able to automatically adjust process alarm limits according to the present invention, applicant submits that claims 3 to 6, 9 and 10 satisfy the requirements of 35 U.S.C. 112, first paragraph.

Since claims 1 to 10 have been shown to be drawn to patentable subject matter under 35 U.S.C. 101 and claims 3 to 6, 9 and 10 have been shown to satisfy the requirements of 35 U.S.C. 112, first paragraph, applicant submits that these claims are allowable and respectfully requests the Examiner to pass the

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above-identified application to issuance at his earliest convenience.

Respectfully submitted,

By Frank J. Uxa
FRANK J. UXA,
Reg. No. 25,612,
Attorney for Applicant.

DECEMBER 17, 1973.

Letter of Examiner, March 7, 1974

Paper No. 9

[ ] This application has been examined.
[X] Responsive to communication filed 12–19–1973.
[X] This action is *made final.*

A SHORTENED STATUTORY PERIOD FOR RESPONSE TO THIS ACTION IS SET TO EXPIRE 3 MONTHS(S) ~~DAYS~~ FROM THE DATE OF THIS LETTER.

PART I

THE FOLLOWING ATTACHMENTS(S) ARE PART OF THIS ACTION

a. [ ] Notice of References Cited, Form PO–892.
b. [ ] Notice of Informal Patent Drawing, PO–948.
c. [ ] Notice of Informal Patent Application, Form PO–152.
d. [ ]

PART II

SUMMARY OF ACTION

1. [X] Claims 1–10 are presented for examination.
2. [ ] Claims ———— are allowed.
3. [ ] Claims ———— would be allowable if amended as indicated.
4. [X] Claims 1–10 are rejected.
5. [ ] Claims ———— are objected to.
6. [ ] Claims ———— are subject to restriction or election requirement.
7. [ ] Claims ———— are withdrawn from consideration.
8. [ ] Since this application appears to be in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under Ex parte Quayle, 1935 C.D. 11; 453 OG. 213.

9. [ ] Since it appears that a discussion with applicant's repesentative may result in agreements whereby the application may be placed in condition for allowance, the examiner will telephone the representative within about 2 weeks from the date of this letter.
10. [ ] Receipt is acknowledged of papers under 35 USC 119, which papers have been placed of record in the file.
11. [ ] Applicant's claim for priority based on an application filed in _____ on _____ is acknowledged. It is noted, however, that a certified copy as required by 35 USC 119 has not been received.
12. [ ] Other.

Claims 1–10 are again rejected under 35 U.S.C. 101 as being drawn to an invention which is not one of the types of inventions set forth in 35 U.S.C. 101 as patentable under the Statutes. The only difference between the claims and the prior art is in the mathematical formula involved in updating the value of an alarm limit.

It is the Examiner's opinion that the claims are in fact drawn to an algorithm. A patent containing these claims would in effect be a patent on the algorithm itself.

Except for the term "automatically in claim 3, which term is unsupported by structure or method steps, the claims clearly read on an operator making "pencil and paper" calculations and adjusting the controls accordingly.

Applicant contends that he has clearly invented a method useful within the technological arts as required by 35 U.S.C. 101 and cites In re Waldbaum in support of his contention.

The manual method of practicing applicant's invention is clearly set forth in the application. This consists of making observations of a process variable. Calculating new alarm limits when the variable has changed and adjusting the limit on the alarm to correspond to the new calculated alarm limit.

The act of manually updating fixed alarm limits as process variables change is conventional. See page 2, lines 5–10 of applicants' specfication. A mathematical step of computing new alarm limits is obviously involved and finally a step is involved of adjusting the limit on the alarm to correspond to the new calculated alarm limit.

It would appear that in view of Waldbaum, applicant's contention is correct that he was clearly invented a method useful within the technological arts as required by 35 U.S.C. 101, however, in view of the later decision by the same court in In re Christensen they held that notwithstanding the fact that the process before them was obviously in the technological art, "that the addition of the old and necessary antecedent steps of establishing values for the variables in the equation cannot convert the unpatentable method to patentable subject matter."

The only difference between that which is conventional and that disclosed by applicant is the computation of the alarm limit, for this reason the claims are held to directed to an invention which is not one of the types of inventions set forth in 35 U.S.C. 101.

Claims 3–6, 9 and 10 are rejected and the specification objected to under 35 U.S.C. 112, 1st paragraphs in that they insufficiently discloses the invention. There is insufficient disclosure of how the alarm limits are "automatically" adjusted and of the electronic means used.

Applicant again makes reference to the three publications supplied in his response of July 9, 1973 as purporting to show that anyone skilled in the art could implement his invention. No where in these publications is there a showing of how the automatic-alarming equipment may be modified, either by hardware or by software, to accomplish applicant's invention of "automatically" carrying out his invention. Applicant quotes from one of the supplied publications on page 4, between lines 10 and 11 of his response of December 19, 1973. No where in this quote is there even a suggestion that the equipment updates the alarm limits without user intervention.

The other quote on the same page 4 between lines 18 and 19, fails to support applicants contention that it clearly shows automatic-alarming equipment. No where in this quote is there a mention that the limit checks involved computations. There is a mention of calculations but this is for control purposes.

This action is FINAL.

EUGENE G. BOTZ,
Examiner,
Group Art Unit 236.

Amendment, May 23, 1974

10

Hon. COMMISSIONER OF PATENTS,
Washington, D.C. 20231

SIR: Please amend the above-identified application as follows:

IN THE CLAIMS:

* * * * *

For Claims 1 and 3, see Rejected Claims 1 and 3.

* * * * *

Remarks

The above-identified application has been carefully reviewed and amended in light of the Examiner's communication mailed March 7, 1974, which included a final rejection of all claims presented. Since the above-identified application has been amended to be allowable, or, if necessary, in better form for appeal, applicant requests that this SECOND AMENDMENT UNDER RULE 116 be entered.

Claim 1 has been amended to make clear that after the updated alarm limit value is determined, the relevant alarm limit is adjusted to this updated alarm limit value. This amendment is fully supported by the present specification, for example, at page 3, line 10 to page 4, line 5 and the Examples. Claim 3 has been amended to be consistent with claim 1.

Claims 1 to 10 have been rejected under 35 U.S.C. 101 as being drawn to an invention which is not one of the types of inventions set forth as patentable. Applicant traverses this rejection.

The present invention comprises a new and technologically useful method for adjusting at least one alarm limit on at least one process variable involved in a catalytic conversion process to an updated alarm limit value. The present method comprises:

(1) determining the present value of the process variable in question; (2) determining a new alarm base using a defined mathematical relationship; (3) determining an updated alarm limit value equal to the new alarm base plus a predetermined alarm offset; and thereafter, (4) adjusting the alarm limit to the updated alarm limit value. Step 4, i.e., adjusting the alarm limit to the updated alarm limit value, is a positive step of the method recited in claims 1 to 10 and clearly does not involve the solving of a mathematical relationship.

The Examiner contends that claims 1 to 10 are drawn to the mathematical relationships involved in steps 2 and 3 of the present claims and, therefore, these claims are drawn to unpatentable subject matter under 35 U.S.C. 101. To support his position that the claims are drawn to unpatentable subject matter, the Examiner relys on In re Christensen, CCPA, 178 U.S.P.Q. 35. The Examiner does state that the present claims would be directed toward patentable subject matter under 35 U.S.C. 101 if the holding of In re Waldbaum, CCPA, 173 U.S.P.Q. 430, applied. However, the Examiner contends that In re Christensen overrules the holding of In re Waldbaum.

However, the Court In re Christensen clearly intended the holding in that case to have only limited applicability. For example, the Court in the last paragraph of page 37 states:

> * * * The issue before us in the instant case is also a *narrow* one, namely, is a method claim in which at the point of novelty is a mathematical equation to alarm limits.

In brief, the Examiner is attempting to extend the expressly narrow holding of In re Christensen to preclude the patentability of the present claims. Applicant submits that the Examiner has no basis for such extension. The present fact situation, as noted above, is distinguished from the facts of In re Christensen. Clearly, In re Christensen does not even touch, let alone, overrule, the validity of In re Waldbaum. This is particularly true in view of the Court's statement in In re Christensen that:

> * * * In reaching our conclusion * * * we find it unnecessary to discuss the correctness or the rationale of any of our prior decisions * * *

For these reasons and since the present method is admittedly useful within the technological arts, applicant submits that claims 1 to 10 are drawn to patentable subject matter under 35 U.S.C. 101.

Claims 3 to 6, 9 and 10 have been rejected under 35 U.S.C. 112, first paragraph, as being drawn to an invention which is insufficiently disclosed. Applicant traverses this rejection.

The presently rejected claims are directed to a method for automatically adjusting at least one alarm limit on at least one process variable which comprises (1) determining the present value of the process variable in question; (2) determining a new alarm base using the present value of the process variable and a defined mathematical relationship; (3) determining an updated alarm limit value equal to the new alarm base plus a predetermined alarm offset; and thereafter (4) automatically, i.e., without human manipulation of the alarm limit, adjusting the alarm limit to the updated alarm limit value. This embodiment of the present invention can be carried out using conventional automatic monitoring-alarming equipment, e.g., a digital computer. Applicant submits that the present disclosure describes the invention in such full, clear, concise and exact terms as to enable one skilled in the art to practice it.

Applicant has previously submitted publications which demonstrate that the present specification is sufficient to enable one skilled in the art to practice the present invention. Two quotations from one of these publications, i.e., *Summary Manual/GE–DDC Direct Digital Control*, i.e., "Summary Manual", are as follows:

> Limit Check
>
> After filtering, inputs are compared to *adjustable* high and low limits which are defined by user. * * * [Emphasis added]
>
> BICEPS scans the process sensors, filters the measurements signals, performs limit checks, and computes set points. The process loops are defined by filling out special forms, from which punched cards are prepared for reading into the computer's memory. Individual loop control calculations may be specified through a special, but simple, BICEPS Programming Language (BPL). The language is similar to FORTRAN, and allows process engineers with little or no programming experience to define the specific calculations needed for each loop.

These two quotations, while not even suggesting the present invention, make clear the conventional nature of the hardware, e.g., automatic equipment, and software, e.g., computer programs, which can be used in practicing the present invention. The first quote refers to several functions of a digital computer used in process monitoring-alarming and control. Thus, "Summary Manual" teaches a computer which functions to automatically adjust alarm limits according to a user supplied, e.g., programmed, definition. In the second quote, "Summary Manual" teaches that software, e.g., BICEPS, is available which can be used in conjunction with this digital computer to adjust limits according to a defined program and make comparitive checks.

The Examiner contends that the first quote from "Summary Manual" does not include even a suggestion that the equipment updates the alarm limit without user intervention. Further, the Examiner contends that there is no mention that the limit checks involve computations.

Figure 6 on page 4 of "Summary Manual" is a graphic illustration of basic direct digital control. It is clear from the context of "Summary Manual" that the functions set forth in each of the four boxes, i.e., Scan, Input Processing, Output Computation and Output, of Figure 6 are performed automatically, i.e., by digital computer. In particular, Input Processing is strictly an automatic function, in other words, no continuing input from outside the computer is present nor is there any signal directed outside the computer. Since such Input Processing involves no continuing input from outside the computer, the user defined adjustable limits referred to in the first quotation above are adjustable by computations performed totally within the computer according to a supplied program. Also, since the limits referred to in this first quotation are so adjustable, it follows that the general reference to limit checks in the second quotation can involve computations to, for example, determine the updated value of an adjustable limit. Thus, "Summary Manual", taken as a whole, teaches that limits can be adjusted automatically using conventional means, e.g., digital computers and available software. Since such means is conventional and

236-017—78——5

well known in the art, the present specification describing means for automatically adjusting alarm limits as such is sufficient to enable one skilled in the art to practice the present invention. Therefore, applicant submits that claims 3 to 6, 9 and 10 satisfy the requirement of 35 U.S.C. 112, first paragraph and are allowable.

In addition, the Examiner's attention is directed to Great Britain Patent 923,799 (British) which was cited of interest in the Examiner's Communication mailed October 25, 1972, in the above-identified application. This reference relates to automatic monitoring-alarming equipment (page 1, lines 9 to 13). In particular, British, as page 1, lines 49 to 67, is as follows:

> According to another aspect of the present invention a safety, alarm, or like circuit for a monitoring system in which cyclically appearing monitored signals derived from respective monitoring means are compared with a reference signal, includes means for storing the average value of a succession of monitored signals in a cycle, *means for computing a new average value in dependence upon the value of each succeeding monitored signal,* comparator means for comparing the value of each said succeeding monitored signal value with the new average value, and a safety, or alarm, device arranged to be operated when the comparator means detect a discrepancy between a said monitored signal value and the stored average value and in excess of a predetermined amount. [Emphasis added]

Thus, British, while not teaching or even suggesting the present invention, clearly teaches that the present value of a monitored signal is used in *computing* an updated alarm limit value (new average value) to which the alarm limit is then automatically adjusted. In short, British, by teaching one such means, clearly demonstrates that means for automatically adjusting alarm limits are conventional and well known in the art. Therefore, since British confirms the statement in the present specification that automatic alarming-monitoring equipment capable of carrying out the present invention is conventional and well known in the art, applicant submits that the present disclosure is sufficient to enable one skilled in the art to practice the invention set out in claims 3 to 6, 9 and 10. For this additional reason, applicant submits that these claims satisfy the requirements of 35 U.S.C. 112, first paragraph and are allowable.

Since claims 1 to 10 have been shown to be drawn to patentable subject matter under 35 U.S.C. 101 and claims 3 to 6, 9 and 10 have been shown to satisfy the requirements of 35 U.S.C. 112, first paragraph, applicant submits that these claims are allowable and respectfully requests the Examiner to pass the above-identified application to issuance at his earliest convenience.

Respectfully submitted,

By Frank J. Uxa
FRANK J. UXA,
Reg. No. 25,612,
Attorney for Applicant.

MAY 20, 1974.

Letter of Examiner, June 10, 1974

Paper No. 11

ADVISORY ACTION

[X] THE PERIOD FOR RESPONSE IS EXTENDED TO RUN 4 MONTHS *FROM THE DATE OF THE FINAL REJECTION*. 855 O.G. 1109.

[X] Appellant's Brief is due in accordance with Rule 192(a).

Applicant's response to the final rejection, filed 5-23-74, has been considered with the following effect, but it is not deemed to place the application in condition for allowance:

1. [ ] The proposed amendments to the claims and/or specification will not be entered and the final rejection stands because:
   a. [ ] There is no convincing showing under Rule 116(b).
   b. [ ] They raised new issues that would require further consideration and/or search.
   c. [ ] They raise the issue of new matter.
   d. [ ] They are not deemed to place the application in better form for appeal by materially reducing or simplifying the issues for appeal.
   e. [ ] They present additional claims without cancelling a corresponding number of finally rejected claims.
2. [ ] Newly proposed or amended claims ——— would be allowed if submitted in a separately filed amendment cancelling the non-allowable claims.
3. [X] Upon the filing of an appeal, the proposed amendment [X] will be [ ] will not be, entered and the status of the claims in this application would be as follows:

   a. [ ] Claims ——— would be allowable.
   b. [X] Claims 1-10 would not be allowable.

   However:

   (1) [ ] The rejection of claims ——— on references is deemed to be overcome by applicant's response.

   (2) [X] The rejection of claims ——— on non-reference grounds only is deemed to be overcome by applicant's response.

4. [ ] The affidavit, exhibit or request for reconsideration has been entered but does not overcome the rejection.
5. [ ] The affidavit or exhibit will not be admitted because applicant has not shown good and sufficient reasons why it was not earlier presented.
6. [ ] The application having been examined under the special accelerated examining procedure (M.P.E.P. 708.02), the proposed amendment has not been considered since it does not prima facie place the application in condition for allowance or in better condition for appeal.

Eugene G. Botz

EUGENE G. BOTZ,

Examiner,

Group Art Unit 236.

Appeal to Board of Appeals, July 9, 1974

No. 12

To Commissioner of Patents

SIR: Applicant hereby appeals to the Board of Appeals from the decision dated March 7, 1974 of the Primary Examiner finally rejecting claims 1 to 10.

The item(s) checked below are appropriate:

1. [ ] An extension of time to respond to the final rejected was granted on ———— for ———— month(s).
2. [X] A timely response to the final rejection has been filed, as provided in 841 O.G. 1411.
3. [X] Fee $50.00:
   - [ ] Enclosed
   - [X] Not required (Fee paid in prior appeal) Fee Paid September 4, 1973.
   - [ ] Charge to Deposit Account No. ————. (One additional copy of this Notice is enclosed herewith.)

Respectfully submitted,

Frank J. Uxa,
FRANK J. UXA,
Reg. No. 25,612,
Attorney for Applicant(s).

JULY 1, 1974.

Brief, August 19, 1974

No. 13

Hon. COMMISSIONER OF PATENTS,
Washington, D.C. 20231.

SIR: This is an appeal from the Final Rejection of March 7, 1974, finally rejecting claims 1 to 10, all the claims in the case. A Second Amendment Under Rule 116 will be entered upon the filing of the present appeal. Therefore, claims 1 to 10 remain in the case and are before The Board of Appeals.

ORAL HEARING

An oral hearing is requested.

* * * * *

For Claims 1 to 10 inclusive, see Rejected Claims 1 to 10 inclusive.

THE INVENTION

The present invention relates to an improved method for adjusting at least one alarm limit on at least one process variable involved in a catalytic conversion process to an updated alarm limit value. The present method comprises: (1) determining the present value of the process variable in question; (2) determining a new alarm base using a defined mathematical relationship; (3) determining an updated alarm limit value which is equal to the new alarm base plus a predetermined alarm offset; and thereafter, (4) adjusting the alarm limit to the updated alarm limit value. In a preferred embodiment, step 4 of the present invention comprises automatically, i.e., without human manipulation of the alarm limit, adjusting the alarm limit to the updated alarm limit value. This embodiment can be carried out using conventional automatic monitoring-alarming equipment, for example, electronic means such as a digital computer.

DESCRIPTION OF THE REFERENCES

No references have been cited against the present claims.

THE EXAMINER'S REJECTION

Claims 1 to 10 have been rejected under 35 U.S.C. 101 as being drawn to an invention which is not one of the types of inventions set forth in 35 U.S.C. 101 as patentable under the Statutes. The Examiner contends that the present claims are drawn to the mathematical relationships recited in steps 2 and 3 of the present method and, further, that In re Christensen, CCPA, 178 U.S.P.Q. 35, overruled the holding of In re Waldbaum, CCPA, 173 U.S.P.Q. 430. Therefore, the Examiner concludes that the present claims are drawn to subject matter which is unpatentable under 35 U.S.C. 101.

Claims 3 to 6, 9 and 10 have been rejected under 35 U.S.C. 112, first paragraph, as being drawn to an invention which is insufficiently disclosed by the specification. The Examiner contends that there is insufficient disclosure as to how the alarm limits are automatically adjusted and of the electronic means used.

THE ISSUES

The legal issues on appeal are:

Whether claims 1 to 10 are directed to an invention of the types patentable under 35 U.S.C. 101.

Whether claims 3 to 6, 9 and 10 are supported by sufficient disclosure under 35 U.S.C. 112, first paragraph.

The factual issue to be determined with regard to the legal issue under 35 U.S.C. 101 is as follows:

Whether the claimed invention is directed to a new and useful method.

The factual issue to be determined with regard to the legal issue under 35 U.S.C. 112, first paragraph is as follows:

Whether the present specification describes the invention of claims 3 to 6, 9 and 10 in such full, clear, concise and exact terms as to enable any person skilled in the art to practice the invention.

APPELLANT'S ARGUMENTS WITH REGARD TO THE REJECTION UNDER 35 U.S.C. 101

Appellant has discovered a new and technologically useful method for adjusting at least one alarm limit on at least one process variable involved in a catalytic conversion process to an updated alarm limit value. The present method comprises: (1) determining the present value of the process variable in question; (2) determining a new alarm base using a defined mathematical relationship; (3) determining an updated alarm limit value which is equal to the new alarm base plus a predetermined alarm offset; and thereafter, (4) adjusting the alarm limit to the updated alarm limit value. Step 4, i.e., adjusting the alarm limit to the updated alarm limit value, is a *separate and positive* step of appellant's method set forth in claims 1 to 10 and clearly does not involve the solving of a mathematical relationship.

The Examiner contends that the present claims are drawn to the mathematical relationships involved in steps 2 and 3 and that, therefore, these claims are drawn to unpatentable subject matter under 35 U.S.C. 101. To support his position, the Examiner relies on In re Christensen, CCPA, 178 U.S.P.Q. 35. The Examiner does state that the present method is useful in the technological arts and that the present claims would be directed toward patentable subject matter under 35 U.S.C. 101 if the holding of In re Waldbaum, CCPA, 173 U.S.P.Q. 430, applied. However, the Examiner contends that In re Christensen overruled the holding of In re Waldbaum.

Therefore, one question which must be resolved is whether, in fact, In re Christensen did overrule the holding of In re Waldbaum so as to render the present claims unpatentable under 35 U.S.C. 101. In essence, In re Waldbaum holds that a method which is useful in the technological, i.e., useful, arts is a statutory method within the meaning of 35 U.S.C. 101. In the later case, the Court clearly intended the holding of In re Christensen to have only limited applicability. For example, the Court in In re Christensen at the last paragraph of page 37 states:

> * * * The issue before us in the instant case is also a *narrow* one, namely, is a method claim in which the

> point of novelty is a mathematical equation to be solved as the *final step* of the method, a statutory method? [Emphasis added]

The Court answered the narrow question presented in the negative. Thus, In re Christensen holds that: A method claim in which the point of novelty is a mathematical equation to be solved as the final step of the method is unpatentable under 35 U.S.C. 101. Moreover, it is also very clear that the Court did not believe this holding should be extended beyond the precise facts of In re Christensen.

Appellant submits that the narrow holding of In re Christensen does not negate the patentability of the present claims under 35 U.S.C. 101. For example, while In re Christensen narrowly holds that a method in which the solving of a novel Mathematical equation is the *final step* is not a statutory method, *step 4 of the present claims,* i.e., adjusting the alarm limit to the updated alarm limit value, *does not involve the solving of a mathematical equation.* The claims rejected In re Christensen were directed toward solving a mathematical relationship merely to determine an abstract value, i.e., the porosity of a rock formation. The present claims are not drawn to an abstract mathematical relationship or algorithm. Appellant seeks patent protection for a technologically useful method for adjusting at least one alarm limit on at least one process variable involved in a process comprising catalytic chemical conversion of hydrocarbons.

The Examiner is attempting to extend the expressly narrow holding of In re Christensen to overrule In re Waldbaum and, thus, to preclude the patentability of the present claims under 35 U.S.C. 101. Appellant submits that the narrow holding of In re Christensen does not even touch, let alone, overrule, In re Waldbaum. For example, the Court in In re Christensen, at the first full paragraph of page 38, states that:

> • • • In reaching our conclusion in light of Benson (Gottschalk, Comr. Pat. V. Benson et al, U.S. Supreme Ct., 175 U.S.P.Q. 673), we find it unnecessary to discuss the correctness or the rationale of any of our prior decisions in a line of cases starting with In re Abrams, 38 CCPA 945, 188 F. 2d. 165, 89 U.S.P.Q. 266 (1951).

Thus, it is clear that the Court expressly limits the holding of In re Christensen to the precise fact situation involved and that

In re Christensen does not overrule the holding of In re Waldbaum.

In summary, the narrow holding of In re Christensen that a method claim in which the point of novelty is a mathematical equation to be solved as the final step of the method is unpatentable does not negate the patentability of the present claims under 35 U.S.C. 101. For example, the last recited step of the present claims, i.e., step 4, does not involve the solving of a mathematical equation. Appellant has discovered a technologically useful method for adjusting at least one alarm limit on at least one process variable involved in a process comprising catalytic chemical conversion of hydrocarbons. Such a method involves patentable subject matter under the holding of In re Waldbaum and as noted above, the expressly narrow holding of In re Christensen does not overrule In re Waldbaum. Therefore, appellant submits that claims 1 to 10 are drawn to patentable subject matter under 35 U.S.C. 101.

APPELLANT'S ARGUMENTS WITH REGARD TO THE REJECTION UNDER 35 U.S.C 112, FIRST PARAGRAPH

Appellant has discovered an improved method for automatically adjusting at least one alarm limit on at least one process variable using, for example, electronic means such as a digital computer. The method involves predetermining a number F between zero and 1.0 and an alarm offset K. On pages 6 and 7 of the present specification, appellant has disclosed that automatic monitoring-alarming equipment is supplied with K, F and certain mathematical relationships needed to determine the updated value of the alarm limit. The equipment scans and determines the present value of the process variable in question. Using this value and the other inputs noted above, the equipment determines at least one updated alarm limit value and, thereafter, automatically adjusts the alarm limit to this updated alarm limit value. This embodiment is also llustrated in Example II of the above-identified application. In each nstance, the equipment, e.g., electronic means such as a digital computer, which may be used to automatically adjust alarm limits according to the present invention is conventional and well known in the art.

The present method involves certain mathematical relationships. In order to input these mathematical relationships into

the conventional automatic monitoring alarming equipment and calculate an updated alarm limit, the equipment must be given instructions, for example, in the form of a computer program. Appellant has fully disclosed the mathematical relationships used to update alarm limits according to the present invention. Having this disclosure, it is well within the ordinary skill of the art to program such conventional equipment to update alarm limits according to the present invention.

In order to show that such automatic monitoring-alarming equipment, e.g., electronic means, which can be used to automatically adjust alarm limits according to the present invention is conventional and well known in the art, copies of the following are attached hereto:

> Wherry, T.C. et al, *Direct Digital Control,* Chemical Engineering Progress, Vol. 64, No. 4, pp. 33–38 (April 1968). (Exhibit A)
>
> *GE/PAC 4020, System Summary Manual,* p. 2–2, Copyright 1970 by General Electric Co. (Exhibit B)
>
> *Summary Manual/GE–DDC Direct Digital Control,* pp. 4 and 5, Copyright 1969 by General Electric Co. (Exhibit C)

Each of these publications refers to automatic equipment involving a digital computer which can be used for automatic process monitoring-alarming. For example, Wherry et al teaches that such equipment can check the present value of a process variable against pre-set alarm limits and, if necessary, initiate an alarm (page 34, last paragraph starting in column 3).

Two quotations, the first from *Summary Manual/GE–DDC Direct Digital Control* and the second from *GE/PAC 4020, System Summary Manual* of particular importance are as follows:

> Limit Check
>
> After Filtering, inputs are compared to *adjustable* high and low limits which are defined by user. * * * [Emphasis added]
>
> * * * * * *
>
> BICEPS scans the process sensors, filters the measurements signals, performs limit checks and computes set points. The process loops are defined by filling out special forms, from which punched cards are prepared for reading into the computer's memory. Individual loop control calculations may be specified through a special, but simple, BICEPS programming Language (BPL). The language is similar to Fortran, and allows process engineers with little or no programming experience to define the specific calculations needed for each loop.

These two quotations, while not even suggesting the present invention, make clear the conventional nature of the hardware, e.g., automatic equipment and software, e.g., computer programs, which can be used in practicing the present invention. The first quote refers to several functions of a digital computer used in automatic monitoring-alarming and process control. Thus, it is conventional for a computer to automatically adjust alarm limits according to a user supplied, e.g., programmed, definition. The second quote refers to conventional computer software, e.g., computer programs, which can be used in conjunction with, for example, the digital computer described previously to adjust alarm limits according to a user-defined program and make comparative checks.

Figure 6 on page 4 of *Summary Manual/GE–DDC Direct Digital Control* is a graphic illustration of basic direct digital control. The functions set forth in each of the four boxes, i.e., Scan, Input Processing, Output Computation and Output, of Figure 6 are performed automatically, i.e., by digital computer. In particular, Input Processing is strictly an automatic function. In other words, with regard to Input Processing, no continuing input from outside the computer is present, nor is there any signal directed outside the computer. Since such Input Processing involves no continuing input from outside the computer, the adjustable values of the user-defined limits referred to in the first quotation above are determined by computations performed totally within the computer according to a supplied program. Further, it is clear that the adjustable limits are automatically updated to reflect the new limit value. Also, since the values of the limits referred to in this first quotation are so adjustable, it follows that the general reference to limit checks in the second quotation can involve computations to, for example, determine the updated limit value which is then used to automatically update the adjustable limit.

In addition, the Board's attention is directed to Great Britain Patent 923,799 (British), a copy attached as Exhibit D, which

was cited of interest in the Examiner's Communication mailed October 25, 1972, in the above-identified application. This reference relates to automatic monitoring-alarming equipment (page 1, lines 9 to 13). In particular, British, at page 1, lines 49 to 67, is as follows:

> According to another aspect of the present invention a safety, alarm, or the like circuit for a monitoring system in which cyclically appearing monitored signals derived from respected monitoring means are compared with a reference signal, includes means for storing the average value of a succession of monitored signals in a cycle, *means for a computing a new average value in dependence upon the value of each succeeding monitored signal,* comparator means for comparing the value of each said succeeding monitored signal value with the new average value, and a safety, or alarm, device arranged to be operated when the comparator means detect a discrepancy between a said monitored signal value and the stored average value and in excess of a predetermined amount. [Emphasis added]

Thus, British, while not teaching or even suggesting the present invention, clearly teaches that the present value of a monitored signal is used in *computing* an updated alarm limit value (new average value) to which the alarm limit is then automatically adjusted. In short, British, by teaching one such means, clearly demonstrates that means for automatically adjusting alarm limits are conventional and well known in the art. Therefore, British confirms the statement in the present specification that alarming-monitoring equipment capable of automatically adjusting alarm limits according to the present invention is conventional and well known in the art.

In summary, the prior art, for example, *GE/PAC 4020, System Summary Manual, Summary Manual/GE–DDC Direct Digital Control* and Great Britain Patent 923,799, taken as a whole, teaches that alarm limits can be automatically adjusted using conventional means, e.g., electronic digital computers and available software. Since such means is conventional and well known in the art, the present specification describing means for automatically adjusting alarm limits as such is sufficient to enable one skilled in the art to practice the invention. In re Myers, CCPA, 161 U.S.P.Q. 668; In re Nelson, CCPA, 126

U.S.P.Q. 242. Therefore, appellant submits that the present disclosure is in such full, clear, concise and exact terms as to enable one skilled in the art to practice the invention set out in claims 3 to 6, 9 and 10 and that, therefore, these claims satisfy the requirements of 35 U.S.C. 112, first paragraph and are allowable.

CONCLUSION

Since the present claims have been shown to be directed to patentable subject matter under 35 U.S.C. 101 and to be supported by the present specification sufficiently to satisfy the requirements of 35 U.S.C. 112, first paragraph, appellant submits that the above-identified application is allowable and respectfully requests This Honorable Board of Appeals to reverse the Examiner's Final Rejection and hold claims 1 to 10 allowable.

Respectfully submitted,

By Frank J. Uxa
FRANK J. UXA,
Reg. No. 25,612,
Attorney for Appellant.

AUGUST 15, 1974.

Examiner's Answer, October 9, 1974

Paper No. 14

This is an appeal from the final rejection of Claims 1–10: no claims having been allowed.

A correct copy of the appealed claims appears on pages 1 and 2 of Appellant's brief.

THE GROUND OF FINAL REJECTION

Claims 1–10 are rejected under 35 U.S.C. 101 as being drawn to an invention which is not one of the types of inventions set forth in 35 U.S.C. 101 as patentable under the Statute. For a clear exposition of this rejection, the statements set forth in the final rejection are incorporated herein by reference.

The rejection made under 35 U.S.C. 112 is withdrawn.

RESPONSE TO APPELLANT'S ARGUMENTS WITH REGARDS TO THE REJECTION UNDER 35 U.S.C. 101

The Appellant contends that "one question which must be resolved is whether, in fact, In re Christensen did overrule the holding of In re Waldbaum". Appellant contends that In re Christensen is applicable only where a mathematical equation to be solved is the final step of the method.

In re Christensen was cited to show that not all methods within the technological arts are patentable under 35 U.S.C. 101 and that the addition of the old and necessary antecedent steps of establishing values for the algorithm does not convert the unpatentable method to patentable subject matter.

The question to be asked about any invention which involves a formula, algorithm or control technique is wherein is the invention. Evidently, this question was considered and the Court gave their answer in In re Christensen. The fact that the final step of the method, under consideration, was a mathematical equation made the issue a clearer one for the Court to decide. Appellant, apparently, believes that if Christensen had manu-

ally taken the results of the equation and applied them to some control in an obvious and well known manner wherein the only difference over the prior control art was the use of a specific equation for computing this value, Christensen would have an invention under 35 U.S.C. 101. That is if other methods of deriving this value had been used in the control art in the past and Christensen merely found a new mathematical formula or algorithm for developing this value he would have an invention under 35 U.S.C. 101. Here the Examiner draws different conclusions. The Examiner contends that even before Christensen, Waldbaum and other previous decisions, that mathematics as such, and those inventions wherein there was nothing new over the prior art exterior to the formula or mathematics were never considered patentable under 35 U.S.C. 101.

Throughout his remarks Appellant contends that his invention is a technologically useful invention and therefore must be considered as one of the types of inventions set forth in 35 U.S.C. 101.

The Examiner agrees that his invention is a technologically useful invention, however, it is not one of the types of inventions set forth in 35 U.S.C. 101. As explained below a patent granted on Appellant's method or apparatus would in practical effect be a patent on the formula or mathematics itself.

Considering Appellant's description of the prior art on Page 2 of his specification, he states: "the fixed alarm limits may have to be manually updated to reflect this change. If a large number of processes available are changed, the manual updating of the fixed alarm limits becomes a tedious and time-consuming job for the operating personnel. Also, manual changing of the fixed alarm limits may increase the possibility of human error since the new fixed alarm limits may not be set properly." It is obvious from this quote that it has been the practice for control personnel to calculate or rely on previous experience to make a predetermined change in the alarm limit. If we now describe in the languages of appellant's claim the steps taken in making a limit change as taught by the prior art we obviously would have the following steps which the operator must do: (1) determine the present value of the process, (2) (3) determine updated alarm limit value and (4) adjust the alarm limit to the updated alarm limit value. Steps (2) and (3) are mathematical steps for determining an updated alarm limit value.

The mathematical steps (2) and (3) consist of the formulas $B_1 = Bo(1-F) + PVL(F)$ and $UAV = B_1 + K$. The term B represents an alarm base (bo being correct base, B_2 being the new base), PVL is the term representing present process variable, UAV is the updated alarm limit, and K and F equals alarm offset and a predetermined number respectively.

Appellant, on page 4 of his brief, states that the alarm offset K and number F used in the present invention are predetermined, based upon experience with the normal behavior with time of the individual process variable in question, and on page 5 that the values assigned to K and F may be determined through routine experimentation.

It is interesting to note the disclosure on page 4 of Appellant's specification wherein he states: For example, if a given process variable is to be maintained within a relatively narrow range, the values for K and/or F may be relatively small. On the other hand, if the process variable may vary over a wide range without indicating or giving rise to a process upset, the values for K and/or F may be relatively large. Also. the value of F will vary depending on the frequency with which the value of the alarm limit is updated according to the present invention. For example, the value of F may increase as the time between updates is increased. Certainly anyone skilled in the control arts would routinely make the alarm offset K relatively small for process variables which must be maintained within a narrow range. The change due to the value F may not be explicit in a formula to one in the prior art, however, it is contended that inherently one skilled in the art would make adjustments which would reflect a determination such as F represents.

The Examiner has given his understanding of the prior art and how the steps of Appellant's method find their counterpart in this prior art. This analysis along with Appellant's discussion of the prior art wherein he states the disadvantages in the prior art that the job of alarm updating is tedious and time-consuming and that there is the possibility of human error persuade the Examiner that nothing new over the prior art exterior to the formula or mathematics has been produced.

When for the most part, one can only claim the elimination of tedium and human error when automating control and other processes, which are normally performed by humans there is, in

fact, no unexpected results. Mathematics is involved in automating these processes, however, considering the overall results nothing new over the prior art exterior to the mathematics has been produced. To grant patents on this type of invention would in fact be granting patents on formulas, mathematics, and algorithms. No longer would the skillful mathematician be prevented from patenting methods whose only reason for being different from the prior art is in the degree of mathematical sophistication.

A test which could be applied to control methods whose only apparent difference over the prior art appears to be in a mathematical formula or algorithm is would an operator having prior knowledge only, or a prior art system, have sufficient mental or physical ability respectively be expected to duplicate or even improve upon the results produced by the method or system under consideration with the exception of course that the system using mathematics may be faster, and less likely to error and become fatigued when comparing with a human operator.

It is the Examiner's contention that Appellant's results may be produced by an operator having only prior knowledge and that he operating within this prior knowledge could accomplish results even superior to Appellant's system or method, for in fact, the basis for the mathematical formulated method is derived from the mind of the operator.

Eugene G. Botz,
EUGENE G. BOTZ,
Examiner,
Group Art Unit 236.

OCTOBER 7, 1974.

Reply Brief, October 21, 1974

No. 15

Hon. COMMISSIONER OF PATENTS,
Washington, D.C. 20231

SIR: This reply, filed pursuant to Rule 193, is in response to the Examiner's Answer mailed October 9, 1974.

The Examiner now states that *In re Christensen*, CCPA, 178 U.S.P.Q. 35 was cited to show that not all methods within the technological arts are patentable under 35 U.S.C. 101. The Examiner contends that *In re Christensen* provides precedent for the position that any method, whether technologically useful or not, which involves solving a new mathematical equation is unpatentable under 35 U.S.C. 101. This is clearly not the case.

The Court in *In re Christensen* states:

> • • • The issue before us in the instant case is also a *narrow* one, namely, is a method claim in which the point of novelty is a mathematical equation to be solved as the *final step* of the method, a statutory method? [Emphasis added]

Since appellant's methods do not involve a mathematical equation to be solved as the final recited step, the Examiner is seeking to extend the *expressly* narrow holding of *In re Christensen*. However, the Court also made clear that such extension is unwarranted. For example, the Court stated that:

> • • • In reaching our conclusion in light of Benson (Gottschalk, Comr. Pat. v. Benson et al, U.S. Supreme Ct., 175 U.S.P.Q. 673), we find it unnecessary to discuss the correctness or the rationale of any of our prior decisions in a line of cases starting with In re Abrams, 38 CCPA 945, 188 F. 2d. 165, 80 U.S.P.Q. 266 (1951).

In short, *In re Christensen* provides no support for the Examiner's position. The Examiner is left to speculate as to what effect additional method steps would have had on the Court's decision. As noted above, the Court expressly limited the holding of *In re Christensen* to the facts involved. Speculation as

to what the Court would have done in an entirely different fact situation can hardly be used to render the present claims unpatentable under 35 U.S.C. 101. Since *In re Christensen* did not overrule any previous decision, appellant submits that the present admittedly technologically useful methods are patentable under 35 U.S.C. 101.

The Examiner appears for the first time to raise prior art as a basis for rejecting the claims in the above-identified application. Moreover, the Examiner contends that the only thing new about the present methods is the mathematical equations in steps (2) and (3).

No prior art references are, or have ever been, cited against the present claims. No prior art reference or references teach, or even suggest, appellant's invention. By resorting to appellant's disclosure to contend that the present invention is obvious, the Examiner makes clear that only after knowing of the above-identified application would one of ordinary skill in the art practice the present methods and obtain the outstanding benefits achieved by appellant. Moreover, appellant's invention involves a novel combination of steps which, when performed together as set forth in the present claims, achieve technologically useful and improved results. Appellant submits that this technologically useful combination of steps is patentable over the prior art and under 35 U.S.C. 101.

In conclusion, appellant respectfully requests this Honorable Board of Appeals to reverse the final rejection of the Examiner and holds claims 1 to 10 allowable.

Respectfully submitted,

By Frank J. Uxa
FRANK J. UXA,
Reg. No. 25,612,
Attorney for Appellant.

OCTOBER 18, 1974

Opinion and Decision of Board of Appeals, May 19, 1976

Paper No. 18

Before BURNS and SPENCER, Examiners-in-Chief, and LINDQUIST, Acting Examiner-in-Chief

BURNS, *Examiner-in-Chief:* This is an appeal from the final rejection of claims 1–10, constituting all the claims in the case.

The disclosure is directed to a method for updating the value of an alarm limit on a process variable involved in catalytic chemical conversion of hydrocarbons.

We reproduce claim 1 as representative:

1. A method for updating the value of at least one alarm limit on at least one process variable involved in a process comprising the catalytic chemical conversion of hydrocarbons wherein said alarm limit has a current value of

$$Bo+K$$

wherein Bo is the current alarm base and K is a predetermined alarm offset which comprises:

(1) determining the present value of said process variable, said present value being defined as PVL:

(2) determining a new alarm base, B_1, using the following equation:

$$B_1=Bo\ (1.0-F)+PVL\ (F)$$

where F is a predetermined number greater than zero and less than 1.0;

(3) determining an updated alarm limit value which is defined as B_1+K; and, thereafter

(4) adjusting said alarm limit to said updated alarm limit value.

A single rejection is now outstanding against the claims, the examiner having withdrawn a rejection under 35 USC 112 in his answer.

Claims 1–10 have been rejected under 35 USC 101 as being drawn to an invention which is not one of the types of invention set forth in that section of the statute. The examiner states his position in the final rejection as follows:

> The only difference between the claims and the prior art is in the mathematical formula involved in updating the value of an alarm limit.
>
> It is the Examiner's opinion that the claims are in fact drawn to an algorithm. A patent containing these claims would in effect be a patent on the algorithm itself.

The examiner cites *In re* Christensen, 178 USPQ 35, in support of his position.

Beginning on page 4 of his brief, appellant urges that the Christensen case places a narrow construction upon *Gottschalk v. Benson,* 175 USPQ 673. It is urged that the last recited step 4 of the present claims, since it does not involve the solving of a mathematical equation, distinguishes the claims of the instant case from the principles enunciated in Christensen. We have given careful consideration to the arguments advanced by appellant in his brief and reply brief in the light of the rejection as applied in the final rejection and answer. We agree with the examiner. Appellant, in his specification, beginning with paragraph two of page 1, has outlined conventional practice of operating with fixed alarm limits in hydrocarbon processing as practiced in industry and, as the examiner has pointed out, on page 2, lines 5–10 of the specification, appellant has acknowledged the manual updating of fixed alarm limits as conventional. Appellant has contributed formulas to be used in the calculation of alarm limits and indicates in his specification, page 6, line 11 et seq., that he prefers to do this without human manipulation of alarm limits by electronic means. Beginning at page 6, line 21 of the specification, he has this to say:

> This preferred embodiment of the present invention may be achieved by practicing the method of the present invention in conjunction with conventional automatic, e.g., electronic, monitoring-alarming equipment. Thus, automatic monitoring-alarming equipment may be supplied with the relevant alarm offset K and number F as well as the mathematical relationships needed to make certain determinations involved in the

present method. The monitoring-alarming equipment periodically scans the PVL and determines the updated alarm limit (s) using the method of the present invention. The alarm limit (s) of the monitoring-alarming equipment are automatically adjusted, if necessary, to the UAV determined by the method of the present invention. The automatic equipment which may be used in this embodiment of the present invention is conventional and well-known in the art.

We draw the conclusions from these statements that appellant proposes to use conventional automatic alarm adjusting equipment and that the invention is in the method, that is, the formulas or algorithm disclosed and claimed. Appellant has cited two portions of the Christensen decision in support of his arguments. We would add a third portion which lies between the two. We reproduce the portions cited by appellant with a portion added by us:

> The issue before us in the instant case is also a narrow one, namely, is a method claim in which the point of novelty is a mathematical equation to be solved as the final step of the method, a statutory method? We follow the Supreme Court in concluding that the answer is in the negative. Given that the method of solving a mathematical equation may not be the subject of patent protection, it follows that the addition of the old and necessary antecedent steps of establishing values for the variables in the equation cannot convert the unpatentable method to patentable subject matter.
>
> In reaching our conclusion in the light of Benson, we find it unnecessary to discuss the correctness or the rationale of any of our prior decisions in a line of cases starting with In re Abrams, 38 CCPA 945, 188 F. 2d 165, 89 USPQ 266 (1951). Each new appeal must be decided on its own facts and in view of interpretations of the patent law as handed down by the Supreme Court of the United States.

We find appellant's arguments unpersuasive from our reading of the above quoted portions of Christensen. It seems to us that Christensen must be considered a recent pronouncement by the court in construing *Gottschalk* v. *Benson, supra,* as applied to method claims directed to algorithms practiced by computer.

Conventional automatic monitoring-alarm equipment of the kind acknowledged by appellant to be old would appear to encompass an adjusting step such as step (4) of Claim 1. This being so, we think that the coupling of such steps to others such as (2) and (3) which recite the formulas or algorithm of appellant's method would not render the claims patentable in view of the principles stated in Christensen. We will sustain the rejection.

The decision of the examiner is affirmed.

Affirmed by Board of Appeals:

WALTER W BURNS Jr.,
Examiner-in-Chief.

RICHARD A. SPENCER,
Examiner-in-Chief.

WILLIAM F. LINDQUIST,
Examiner-in-Chief (Acting).

Request for Reconsideration, June 4, 1976

No. 19

Hon. COMMISSIONER OF PATENTS AND TRADEMARKS,
Washington, D.C. 20231

SIR: Appellant requests reconsideration of the Board of Appeals' decision dated May 19, 1976, affirming the decision of the Examiner. Appellant had taken an appeal July 1, 1974, from the final rejection of the Examiner mailed March 7, 1974, of claims 1 to 10.

Board of Appeals Decision

The Board of Appeals affirmed the Examiner's decision by stating in relevant part:

> We find appellant's arguments unpersuasive from our reading of the above quoted portions of Christensen. It seems to us that Christensen must be considered a recent pronouncement by the court in construing *Gottschalk* v. *Bensen*, supra, as applied to method claims directed to algorithms practiced by computer.
>
> Conventional automatic monitoring-alarm equipment of the kind acknowledged by appellant to be old would appear to encompass an adjusting step such as step (4) of claim 1. This being so, we think that the coupling of such steps to others such as (2) and (3) which recite the formulas or algorithm of the appellant's method would not render the claims patentable in view of the principles stated in Christensen. We will sustain the rejection.

APPELLANTS' REQUESTED ACTION BY THE BOARD OF APPEALS UPON RECONSIDERATION

Appellants request reconsideration of the Board of Appeals decision dated May 19, 1976, and further request the allowance of claims 1 to 10.

APPELLANT'S ARGUMENTS FOR RECONSIDERATION

Appellants took an appeal from a final rejection mailed March 7, 1974, of claims 1 to 10. These claims had been finally rejected under 35 U.S.C. 101 as being drawn to an invention which is not one of the type of inventions set forth in that section of the statute.

The present claims are directed to a technologically useful method for updating at least one alarm limit on at least one process variable involved in catalytic chemical conversion of hydrocarbons. The present method involves determining certain values based upon mathematical relationships. *After* such determinations have been made, the present claims recite adjusting an alarm limit to the updated limit previously determined. ***The final recited step of the present claims does not involve solving a mathematical equation.***

The following quote from *In re Christensen*, 178 U.S.P.Q. 35, has been cited in support of the Board's position affirming the Examiner's rejection:

> The issue before us in the instant case is also a narrow one, namely, is a method claim in which the point of novelty is a mathematical equation to be solved as the *final* step of the method, a statutory method? We follow the Supreme Court in concluding that the answer is in the negative. Given that the method of solving a mathematical equation may not be the subject of patent protection, it follows that the addition of the old and necessary *antecedent* steps of establishing values for the variables in the equation cannot convert the unpatentable method to patentable subject matter.
>
> In reaching our conclusion in the light of Benson, we find it unnecessary to discuss the correctness or the rationale of any of our prior decisions in a line of cases starting with In re Abrams, 38 C.C.P.A. 945, 188 F. 2d 165, 89 U.S.P.Q. 266 (1951). Each new appeal must be decided on its own facts and in view of interpretations of the patent law as handed down by the Supreme Court of the United States. [Emphasis added]

The quoted portion of *In re Christensen* simply does not provide any support for the Board's position. The present claims are significantly different from the claims involved in *In re Christensen*. For example, the final step recited in the

present claims does not involve the solving of a mathematical equation. In contrast, the claims in issue in *In re Christensen* had as the *final* step: "computing the porosity of the formation from the relation * * * (detailed mathematical equation)". The *express* language of the court in *In re Christensen* limits the authority of that case to claims where the *final* step involves solving a mathematical relationship. Moreover, the present claims do not involve the addition of old and necessary antecedent steps for establishing values for the variable in an equation solved as a final step of the claim process or method. As noted above, the final recited step, i.e., step (4), of the present claims involves adjusting an alarm limit to an updated alarm limit and *does not* involve solving a mathematical equation.

Appellant is not seeking to claim a mathematical algorithm, as was the case in the claims at issue in *In re Christensen* and *Gottschalk* v. *Benson*, 409 U.S. 63, 175 U.S.P.Q. 673. The present claims are directed to technologically useful methods for updating an alarm limit involved in the catalytic chemical conversion of hydrocarbons. Appellant submits that no basis whatever exists, other than improper extension of the *In re Christensen*, holding, for rejecting the present claims under 35 U.S.C. 101.

For these reasons, appellant respectfully requests the Honorable Board of Appeals to reconsider their decision affirming the Examiner's rejection and hold claims 1 to 10 allowable in their present form.

Respectfully submitted,

By Frank J. Uxa
FRANK J. UXA,
Reg. No. 25,612,
Attorney for Appellant.

JUNE 3, 1976.

Opinion and Decision of Board of Appeals, August 24, 1976

Paper No. 20

Before BURNS and SPENCER, Examiners-in-Chief, and LINDQUIST, Acting Examiner-in-Chief

BURNS, *Examiner-in-Chief,*

UPON REQUEST FOR RECONSIDERATION

In a paper filed June 4, 1976, appellant requests that we reconsider our decision dated May 19, 1976, wherein we affirmed a rejection of claims 1–10 under 35 USC 101.

Appellant takes exception to our application of *In re Christensen*, 178 USPQ 35, urging that the case is inapposite for the reason that the claims there in issue differed from the prior art by means of a computing step which was embodied in the *final* step of the claim. Appellant on page 3 of his request makes the following statement:

> The *express* language of the court in *In re Christensen* limits the authority of that case to claims wherein the *final* step involves solving a mathematical relationship * * *
>
> As noted above, the final recited step, i.e., step (4), of the present claims involves adjusting an alarm limit to an updated alarm limit and *does not* involve solving a mathematical equation.

We consider appellant's argument to be specious for we do not understand the substance of the *Christensen* decision to be based upon the fact that *Christensen* happened to include the step in issue as the final step of his claim. Had the step there in issue been next to last, we think the result would have been the same. We would again point to the question put as the first sentence of that portion of *Christensen* which we quoted on page 4 of our decision, namely:

> The issue before us in the instant case is also a narrow one, namely, is a method claim in which *the point of novelty* is a mathematical equation to be solved as

the final step of the method, a statutory method? [Emphasis ours]

We perceived the point of novelty in appellant's claimed method to be found in steps (2) and (3). We do not think that their numerical position in the claim, not being the final step, is controlling.

We have reviewed our original decision in the light of appellant's most recent remarks, in particular those quoted above and also his argument found in the final paragraph of page 3 of the most recent paper to the effect that he considers that he is not seeking to claim a mathematical algorithm. We find no basis for modifying our original decision.

Appellant's request is granted to the extent that we have in fact reviewed our original decision, but is denied as to making any change therein.

Denied

Board of Appeals

WALTER W. BURNS, JR.,
Examiner-in-Chief.
RICHARD A. SPENCER,
Examiner-in-Chief.
WILLIAM F. LINDQUIST,
Examiner-in-Chief (Acting).

Notice and Reasons of Appeal to United States Court of Customs and Patent Appeals, September 20, 1976

No. 21

Hon. COMMISSIONER OF PATENTS AND TRADEMARKS,
Washington, D.C. 20231

SIR: Pursuant to the provisions of 35 U.S.C. 142, appellant through his attorney, hereby gives notice that an appeal is being taken to the United States Court of Customs and Patent Appeals from the decision of the United States Patent and Trademark Office Board of Appeals mailed May 19, 1976, and the decision on Request for Reconsideration mailed August 24, 1976, rejecting all the claims in the above-identified application and refusing a patent for the invention set forth therein.

The following are assigned as reasons of appeal:

The Board of Appeals erred in its decision mailed May 19, 1976 affirming the Examiner's rejection regarding claims 1 to 10 in the above-identified application. In addition, the Board of Appeals erred in a decision mailed August 24, 1976, denying a Request for Reconsideration of its original decision.

Specifically, the Board of Appeals erred in affirming the Examiner's rejection of claims 1 to 10 in the above-identified application under 35 U.S.C. 101. Thus, the Board of Appeals erred in holding, in effect, that (1) claims 1 to 10 in the above-identified application were drawn to an invention which is not one of the types of invention set forth in 35 U.S.C. 101 as patentable under the Statutes; (2) the present claims were drawn to the mathematical relationships recited in steps 2 and 3 of the present claims and (3) *In re Christensen*, C.C.P.A., 178 U.S.P.Q. 35 overruled the holding in *In re Waldbaum*, C.C.P.A., 173 U.S. P.Q. 430.

CONCLUSION

Notice is hereby given to the Commissioner that an appeal to the United States Court of Customs and Patent Appeals is being taken seeking to reverse the Board of Appeals decision

affirming the Examiner's rejection of claims 1 to 10 in the above-identified application under 35 U.S.C. 101 and its denial of a Request for Reconsideration of such decision.

Respectfully submitted,

By Frank J. Uxa
FRANK J. UXA,
Reg. No. 25,612,
Attorney for Appellant.

September 16, 1976.

REJECTED CLAIMS

1. A method for updating the value of at least one alarm limit on at least one process variable involved in a process comprising the catalytic chemical conversion of hydrocarbons wherein said alarm limit has a current value of

$$Bo+K$$

wherein Bo is the current alarm base and K is a predetermined alarm offset which comprises:

(1) Determining the present value of said process variable, said present value being defined as PVL;

(2) Determining a new alarm base B_1, using the following equation:

$$B_1=Bo\ (1.0-F)+PVL\ (F)$$

where F is a predetermined number greater than zero and less than 1.0;

(3) Determining an updated alarm limit value which is defined as B_1+K; and, thereafter

(4) Adjusting said alarm limit to said updated alarm limit value.

2. The method of claim 1 wherein said process variable is a transient process variable.

3. The method of claim 1 wherein step 4 comprises automatically adjusting said alarm limit to said updated value.

4. The method of claim 3 wherein said process variable is a transient process variable.

5. The method of claim 3 wherein the value of at least one alarm limit on each of at least 10 process variables are updated.

6. The method of claim 5 wherein at least one of said process variables is a transient process variable.

7. The method of claim 1 wherein said process comprises petroleum distillate hydrocracking.

8. The method of claim 2 wherein said process comprises petroleum distillate hydrocracking.

9. The method of claim 3 wherein said alarm limit is adjusted to said updated value using electronic means.

10. The method of claim 6 wherein said process comprises petroleum distillate hydrocracking and said alarm limit is adjusted to said updated value using electronic means.

Filed U.S. Court of Customs and Patent Appeals, Oct. 29, 1976; George E. Hutchinson, *Clerk*.

In the United States Court of Customs and Patent Appeals

Patent Appeal No. 77-512

In re application of: Dale R. Flook.
Serial No.: 194,032.
Filed: October 29, 1971.
For: Method for Updating Alarm Limits.

Petition on Appeal

To the United States Court of Customs and Patent Appeals:

Your Petitioner, Dale R. Flook, a citizen of the United States, respectfully represents:

That your Petitioner is the original and first inventor of new and useful improvements relating to methods for updating the value of at least one alarm limit on at least one process variable involved in a process comprising the catalytic chemical conversion of hydrocarbons.

That on October 29, 1971, in the manner prescribed by law, your Petitioner presented his application to the United States Patent and Trademark Office praying that a patent be issued to him for said invention.

That proceedings were had in said Office upon said application; that on May 19, 1976, and August 24, 1976, said application was erroneously rejected by the Patent and Trademark Office Board of Appeals and a patent for said invention was wrongfully refused your Petitioner. Specifically, said Board of Appeals erred in affirming the Patent Examiner's rejection of claims 1 to 10 in said application under Section 101 of Title 35, United States Code.

That on September 20, 1976, your Petitioner, pursuant to Section 142 of Title 35, United States Code, gave notice to the Commissioner of Patents and Trademarks of your Petitioner's appeal to this Honorable Court from said Commissioner's refusal to issue a patent to your Petitioner for said invention

upon said application as aforesaid and filing with said Commissioner, in writing, the specific reasons of appeal.

That your Petitioner has requested that the Commissioner of Patents and Trademarks furnish this Honorable Court with a certified transcript of the record and proceedings relating to said application for patent, including the Notice and reasons of appeal and has further requested the Commissioner of Patents and Trademarks to transmit said transcript to this Honorable Court no later than the maximum time provided for in Rule 4.1 of this Honorable Court.

That your Petitioner is filing the docketing fee in the amount of Fifty Dollars ($50.00) as required by Rule 5.15 of this Honorable Court; a check in the amount of Fifty Dollars ($50.00) made payable to The Clerk, U.S. Court of Customs & Patent Appeals to cover said fee, being attached hereto.

WHEREFORE, your Petitioner prays that his appeal may be heard upon and for the reasons assigned therefor to the Commissioner as aforesaid and that said appeal may be determined and the decision of the Commissioner be reversed that justice may be done in the premises.

Respectfully submitted,

DALE R. FLOOK,
By Frank J. Uxa
FRANK J. UXA,
Attorney for Petitioner.

October 14, 1976.
400 East Sibley Boulevard
Harvey, Illinois 60426
Area Code 312 ED 3-3000

Filed U.S. Court of Customs and Patent Appeals, Oct 29 '76;
George E. Hutchinson, CLERK.

CERTIFICATE OF SERVICE

It is hereby certified that a copy of the foregoing PETITION ON APPEAL has this day been sent by first class mail, postage prepaid, to the Office of the Solicitor, United States Patent and Trademark Office, Washington, D.C. 20231.

DALE R. FLOOK,
By Frank J. Uxa
FRANK J. UXA,
Attorney for Petitioner,
312 ED 3-3000.

October 14, 1976.

U.S. Department of Commerce, United States Patent Office

October 29, 1976.
(Date)

THIS IS TO CERTIFY that the annexed is a true copy from the records of this office of Certain Requested Documents, said Documents being the Record for the United States Court of Customs and Patent Appeals, in the matter of the Pending Application of Dale R. Flook.

Serial Number 194,062

[Filed October 29, 1971]

METHOD FOR UPDATING ALARM LIMITS

[SEAL] By authority of the
Commissioner of Patents

G. V. DORSEY,
Certifying Officer.

Supreme Court of the United States

No. 77-642

LUTRELLE F. PARKER, ACTING COMMISSIONER OF PATENTS AND TRADEMARKS, PETITIONER

v.

DALE R. FLOOK

[Filed January 16, 1978]

Order Allowing Certiorari

The petition herein for a writ of certiorari to the United States Court of Customs and Patents Appeals is granted.